STRUCTURAL

LUMNITE

FOR

STRUCTURAL CONCRETE

★

Service Strength Developed Overnight

Full Working Strength at 24 Hours
Even in Freezing Weather

Resistance to Many Corrosive Conditions

★

The Atlas LUMNITE Cement Co.
United States Steel USS Corporation Subsidiary
Chrysler Building, New York • 208 South La Salle Street, Chicago

Printed in U.S.A.

LUMNITE FOR STRUCTURAL CONCRETE

Concrete made with LUMNITE and the usual aggregates, such as sand, gravel, crushed stone or trap rock, has the strength and durability of ordinary concrete with certain additional valuable characteristics.

24 hours after placing LUMNITE concrete may be subjected to the full load for which it is designed. No other American-made cement will produce the same strength or anywhere near the same strength as LUMNITE in 24 hours. Footings and foundations, in most cases, may be subjected to their full load the day following that in which the LUMNITE concrete is placed. Floor surfaces, either of monolithic LUMNITE concrete or with LUMNITE top courses, are ready for use one day after the floor is finished.

Cold weather concrete construction is facilitated by the use of LUMNITE. Strong, durable concrete can be made in freezing weather, overnight, with little or no protection and without the use of artificial heat. LUMNITE generates within the concrete the warmth necessary to permit its normal hardening activity. This warmth, plus the surpassing speed of hardening, places the concrete beyond danger of frost attack within a few hours of mixing and placing. The graph on page 15 clearly indicates the advantage of LUMNITE over normal portland cement and high early strength portland when concrete work is done at a temperature of 50° F.

LUMNITE is a special cement for special purposes. The suggestions for mixing, placing and curing LUMNITE structural concrete apply, in general, to all types of concrete made with LUMNITE. Exceptions, mainly in regard to type of aggregates, grading of aggregates and proportions of mix, are noted where necessary in this pamphlet and discussed at length in separate pamphlets. ("Refractory Concrete", "Corrosion Resistant Concrete")

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General

LUMNITE is not a portland cement. It must be handled somewhat differently for satisfactory results. In partioular the "Suggestions" in regard to mixing and curing should be carefully followed. These "Suggestions" are summarized on the last two sheets of this pamphlet and are printed on a card attached to each sack of LUMNITE when it is shipped from our mill.

Aggregates

For structural concrete in ordinary service the same aggregates may be used as with portland cement. Clean, hard sand, gravel and crushed stone are suitable provided that they are well graded from fine to coarse as required for good portland cement concrete.

Light-weight structural concrete may be made with LUMNITE and clean, inert, light-weight aggregates, such as Gravelite, Haydite, Raylite and processed slags. Cinders are not recommended for aggregate as they frequently contain impurities which affect the setting and hardening characteristics of LUMNITE.

(Special aggregates are required for concrete exposed to heat and subject to certain corrosive conditions. See pamphlets "Refractory Concrete", "Corrosion Resistant Conorete".)

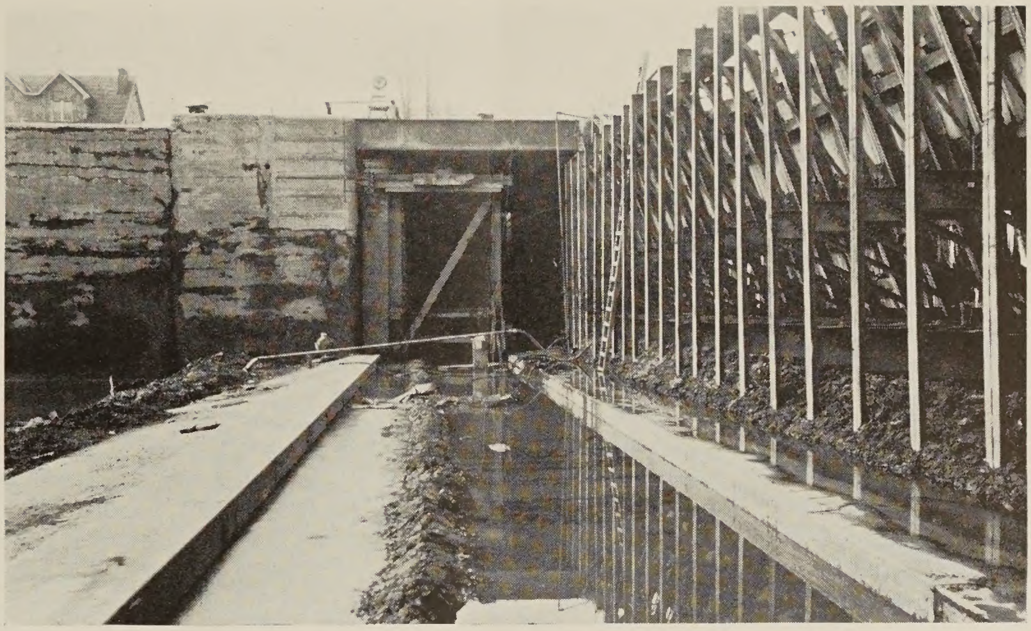
Admixtures

Other cements, limes, anti-freezing compounds, accelerating admixtures and soluble compounds in general should not be mixed with LUMNITE. The mixer, wheelbarrows and other tools should be clean and free from other cements, limes, or soluble materials.

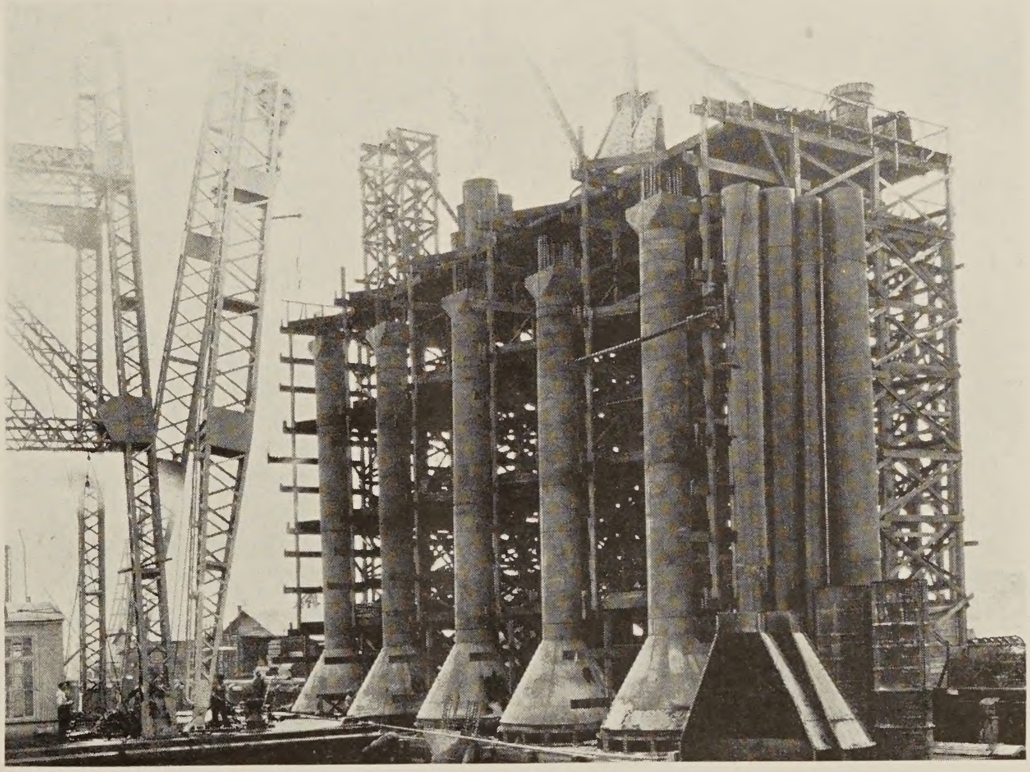
Most mineral pigments used for coloring concrete can be used with LUMNITE. Such coloring materials should be tried first to ascertain their effect on the setting and hardening of LUMNITE.

Measurement of Materials

All materials, including the water, should be accurately measured. Use a cubic-foot box or other container of known capacity to measure the aggregate. One bag of LUMNITE = 94 pounds or one cubic foot or seven and one-half gallons.



United States Engineer Office, Corps of Engineers, U. S. Army, specified LUMNITE Concrete for gate tracks on Ohio River Locks in 1937, after several years' experience with LUMNITE in similar service.



United States Navy Pier, Puget Sound Navy Yard, Bremerton, Wash.
50 ton cylinders precast and ready to place after 24 hours.
240 of these cylinders required about 9000 barrels of LUMNITE.
This LUMNITE concrete in excellent condition after 12 years in sea water.

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https://archive.org/details/lumniteforstruct00atla

Mixing Water

Use the least amount of water possible. For concrete do not use more than 7 gallons of water per sack of LUMNITE, for mortar not more than 5 gallons of water per sack of LUMNITE, including the moisture in the aggregates in these quantities in each case. Use less wherever possible.

The approximate quantity of moisture carried by average aggregates may be estimated from the following table. An accurate determination for the aggregates on the job should be made wherever possible.

Very wet sand - - - - - - - - - - - 3/4 to 1 gal. per cu. ft.
Moderately wet sand - - - - - - - about 1/2 " " " "
Moist sand - - - - - - - - - - - - - about 1/4 " " " "
Moist gravel or crushed rock - - about 1/4 " " " "

Excess mixing water is harmful. Concrete made with 5 gallons of mixing water per sack of LUMNITE will be more than twice as strong as concrete made with 10 gallons. If a workable mix cannot be obtained without excess water, plasticity can generally be improved by increasing the quantity of sand or decreasing the quantity of coarse aggregate in the mix.

The test results summarized below show the effect of Excess Mixing Water on the compressive strength of LUMNITE concrete specimens at the age of 24 hours.*

5.26 gals. water per bag of LUMNITE - 5253 P.S.I. at 24 hr.
6.00 " " " " " " - 4466 " " " "
7.53 " " " " " " - 3258 " " " "
9.41 " " " " " " - 1809 " " " "

Mixing Time

Batches should be machine mixed from one to one and one-half minutes after all materials, including the water, are in the mixer. Prolonged mixing is harmful. Do not mix more than 1½ minutes. Be sure the mixer is clean and free of portland cement, lime or plaster.

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*All test data given in this pamphlet, including the summary on page 6, were obtained by commercial laboratories or investigators independent of The Atlas Lumnite Cement Co.

Proportions

Concrete made of 1 part LUMNITE, approximately 2 parts sand and 4 parts coarse aggregate is satisfactory for most structural purposes. Leaner concrete mixes should be avoided as they may require an excessive amount of mixing water per sack of LUMNITE. Richer concrete mixes are usually unnecessary and uneconomical. They should be used only for concrete of small dimensions.

Mortars made of 1 part LUMNITE and 2-1/2 parts sand meet most of the ordinary requirements of construction. Richer mixes should not be used except in very thin sections.

For floor mixes see the paragraph on proportions under the heading "Floors and Floor Surfaces" on page 8.

> (Proportioning of mixes for Refractory, Heat-Resistant and Insulating Concrete are discussed in pamphlet "Refractory Concrete". The proportions used for ordinary structural purposes as outlined in this paragraph do not apply.)

Curing

Proper curing of LUMNITE concrete is essential. The curing of LUMNITE concrete is distinctly different than the curing of portland cement concrete as the time of set and rate of activity of the cements are widely different.

The rapid hardening of LUMNITE necessitates that all curing be done within 24 hours after the concrete is mixed. Curing is accomplished by spraying the surface of the concrete with water. Do not cure by flooding the surface, or by covering with wet burlap, sawdust, sand or other materials. Steam curing should not be used.

Time of Curing

Under average conditions curing water will be required about 6 hours after mixing. In warm, dry weather it may be required before 6 hours and in cold, damp weather as late as 10 or 12 hours. Curing water applied too soon will lower the surface strength of concrete.

The time for first application of curing water may be determined by rubbing the surface with a moistened finger. IF THE FINGER IS CLEAN AFTER THE RUBBING, SPRINKLING SHOULD START. IF THE FINGER IS SOILED BY THE TEST, SPRINKLING SHOULD BE WITHHELD.

Materials and Proportions

Aggregates and mixes described in the foregoing paragraphs may be used. The maximum size of coarse aggregate should be as large as can be used conveniently, considering the thickness of section of concrete to be placed.

Placing

When large masses of LUMNITE concrete are desired it may be advisable to place them in more than one operation. In general the thickness of a large slab placed at one time should not be greater than 15 inches, unless special provision is made for curing. When a large mass of concrete is placed in two layers 24 hours should be allowed for the curing of the first layer before the concrete for the second layer is placed.

Curing

In mass concrete, forms should be removed as soon as concrete will support its own weight in order to increase the surface area to be cured. Surfaces should then be kept wet, by sprinkling, until concrete is 24 hours old.

A mass of concrete, more than 15 inches thick, which cannot conveniently be placed in more than one layer, may be placed as a unit if provision is made for cooling the interior of the mass during the curing period. The rapid hardening of LUMNITE generates considerable heat in the first 24 hours. The purpose of this cooling of large masses is simply to reduce the temperature within the mass while curing.

Another means of achieving the same end is to place "plumb stones" or one-man stone in the concrete as it is poured. The large stones take up the heat of hydration. The resulting concrete is, in effect, cyclopean concrete, such as has long been used for massive work. When large stone is available cyclopean concrete is decidedly economical, as the volume of mixed concrete required for the structure may be appreciably reduced.

(Foundations exposed to soaking heat, as from furnaces and boilers, require special materials and proportions. These are discussed in pamphlet "Refractory Concrete".)

Industrial Grouting

LUMNITE grout for setting bed plates of heavy machinery and equipment has the high 24-hour strength characteristic of all LUMNITE mortars. One day after placing the grout is ready for full service.

Best results will be had and the least cement used if a relatively dry mortar composed of 1 part cement and 2½ parts sand is used. Only sufficient mixing water should be added so the mortar can be packed under the bed plate. All exposed surfaces should be sprinkled as soon as the cement has set - usually in about 6 hours. The mortar should be kept moist for the next 10 to 14 hours.

Mix	1 day	3 d.	7 d.	28 d.	3 mo.	6 mo.	9 mo.	1 yr.	2 yr.	3 yr.	4 yr.	5 yr.
MORTAR COMPRESSION TESTS												
1:3	4725	4940	4985	5004	5289			5724				
1:3	4342	4790	4934	5052	5135			5077				
1:3	6670	5500	5700	6120	6570			6320		7200		
1:3			6700	6720				6260	8080	7920	7230	7770
CONCRETE COMPRESSION												
1:2:4	3441	4127	4391	4462	4813	4846	5009	5072				
1:2:4	2639		3431	3466		3749		3890	4110	4163		
1:2:4	3707		4060	4315	5547	5638		6370*				
1:2:4	4500		5130	4930	5330	7090		7480				

*14 month test result.

Cement	Mix	W.C.R.	Slump	1 day	2 d.	3 d.	7 d.	3 mo.	1 yr.	10 yr.
LUMNITE	1:1½:3	.627	7"	4290	4387	4380	3423	5367	5175	4850
Portland		.649	5½"	285	690	745	1120	2925	3175	3760
LUMNITE	1:2:4	.800	6"	2797	2930	2917	2963	3163	3333	2907
Portland		.976	6"	242	518	715	965	2816	2722	3065

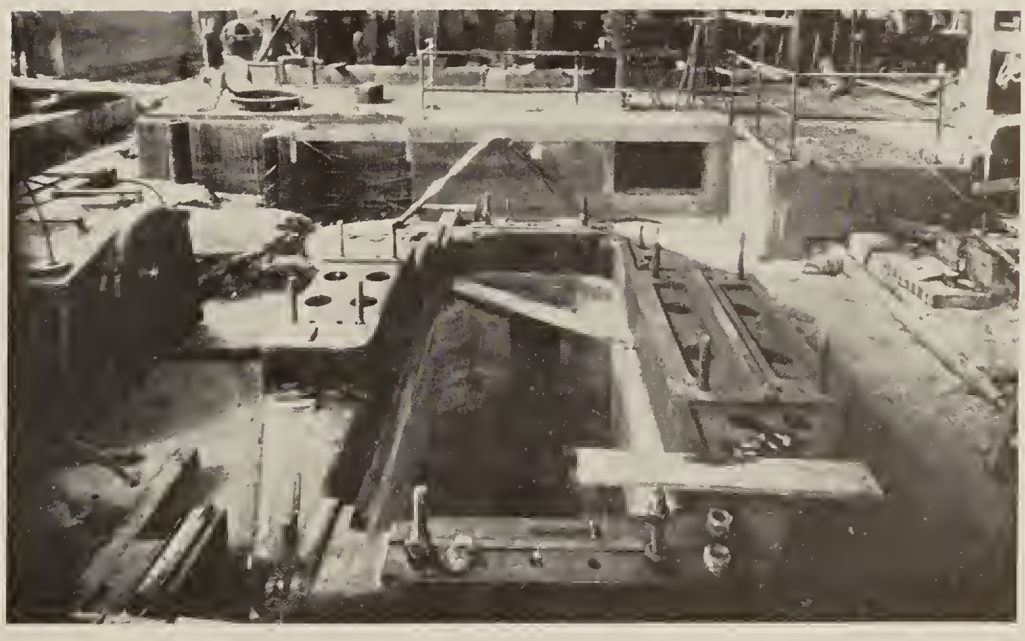
CONCRETE TENSION AND COMPRESSION TESTS

	Portland Cement		LUMNITE	
Age	Tension	Compression	Tension	Compression
1 day	48	440	276	3670
2 days	110	1030	310	4400
3 days	160	1500	314	4890
5 days	190	2000	313	5150
7 days	208	2460	323	4790
10 days	222	2500	323	4800
14 days	249	3160	323	4890
21 days	247	3180	320	4530
28 days	260	3320	305	4830
90 days	326	4210	320	4720

STORAGE IN MEDICINE LAKE, S. D. (Alkaline Sulphate Water)
1:3 Mix

W.C.R.	7 days	28 d.	1 yr.	2 yr.	3 yr.	4 yr.	5 yr.
.44	6210	7680	8000	-----	7370	-----	-----
.51	6700	6780	7420	7690	7240	8840	8950
.53	7080	6620	6210	7400	6710	8650	-----
.59	5060	4830	5560	5060	-----	4750	-----
.73	3380	3090	3730	-----	3350	-----	-----

LUMNITE Concrete Foundations for Six Reaction Chambers Helped Establish a Construction Record at the Refinery of Producers & Refiners Corp., Parco, Wyo.



LUMNITE Concrete Machinery Foundations
Ready for Full Load in 24 Hours.

Floors or floor toppings placed with LUMNITE one day are ready for use the next day even when exposed to heavy loads on steel wheel trucks.

LUMNITE concrete floors resist the attack of many corrosive solutions used in industry. Concrete intended for service under corrosive conditions should be made with well-graded aggregates properly proportioned for maximum density. Aggregates should be selected with regard to their resistance to corrosive attack. Limestone materials, such as crushed limestone and calcareous sands, generally are not suitable. Siliceous sand and gravel or special aggregates should be used.

(Information on concrete for exposure to various corrosive conditions is given in pamphlet "Corrosion Resistant Concrete". This should be referred to when LUMNITE is to be used for such purposes.)

LUMNITE concrete is used for floors subject to high temperatures which cause the rapid disintegration of ordinary concrete. Special aggregates and proportions are used for this purpose.

(See pamphlet "Refractory Concrete")

TOP COURSES FOR FLOORS

Preparation of Base

LUMNITE mortar topping should not be used on an unhardened, freshly placed portland cement concrete base.

LUMNITE mortar toppings may be used on an unhardened, freshly placed LUMNITE base.

LUMNITE mortar toppings will bond to old or hardened portland or LUMNITE cement concrete base.

In order to obtain a satisfactory bond between the topping and old concrete it is important to remove entirely the surface of the old concrete so as to expose a clean, dust-free, hard surface. The thickness of the topping on an old or hardened concrete base should be at least one and one-half inches, including the edges which should have vertical faces.

Materials and Proportions

Clean, hard, well-graded sands are necessary for successful results. The following proportions are generally used:

Coarse sand (graded from dust to 3/8") - 1 part cement to 3 parts sand.
Medium sand (graded from dust to 1/4") - 1 part cement to 2½ parts sand.
Fine sand (graded from dust to 1/8") - 1 part cement to 2 parts sand. When fine sands must be used in mortar toppings, it is suggested that dust-free stone chips or pea gravel be added to the mix. Such mixes have been used in the proportions of 1:1:2, 1:1½:2, 1:2:1 and 1:2:2, depending on the size and character of the sand and coarse material.

Note: All of the foregoing proportions allow for average bulking of the sands.

Admixtures

Other cements, limes, anti-freezing compounds, accelerating admixtures and soluble compounds in general should not be mixed with LUMNITE. The mixer, wheelbarrows and other tools should be clean and free from other cements, limes, or soluble materials.

Most mineral pigments used for coloring concrete can be used with LUMNITE. Such coloring materials should be tried first to ascertain their effect on the setting and hardening of LUMNITE.

Measurement of Materials

All materials, including the water, should be accurately measured. Either weigh or use a cubic foot box or other container of known capacity to measure the sand and stone.

Mixing Water

Excess mixing water is harmful. In mortars never add more than four gallons of water per sack of cement. Use less whenever possible. For effect of excess mixing water see page 3.

Mixing

Batches should be machine mixed from one to one and one-half minutes after all materials, including the water, are in the mixer. Prolonged mixing is harmful.

Placing on Hardened Base

The base should be moistened until it will not readily absorb any more water. Some contractors apply a thin coat of neat cement and water. This coating should be thoroughly broomed and distributed over the surface of the base. If this treatment of the surface is done too far ahead of the placing of the topping, the grout will dry out and a satisfactory bond will not be obtained.

The mortar topping should be spaded or worked into one homogeneous, dense mass free from pockets.

Finish

Screed the mortar with an accompanying tamping and criss-cross movement to insure maximum compacting and uniformity of surface. After screeding the wood float is used a minimum number of strokes. In many cases a wood float finish is all that is desired. For smooth surfaces wood floating is followed by steel trowelling. When trowelling is done too soon it draws water to the surface causing dusty surfaces that are weak and rapidly wear away under traffic.

Wait after screeding and floating until the surface becomes somewhat dull in appearance before beginning torwelling. In warm, dry weather trowelling should start sooner than in cool, damp weather. Under average conditions trowelling is done in from two to four hours after mixing. Some contractors have stated that LUMNITE toppings require less trowelling than is often given portland cement floors.

After LUMNITE cement gets its initial or first set it hardens very rapidly. This necessitates rapid finishing of the particular section of the floor after it has begun to set. LUMNITE cement cannot be retempered or trowelled after it has obtained its final set.

We suggest that when free water rises to the surface it be removed by belting or wiping the surface with a piece of dry burlap or other absorbent material. "Dryer mixtures" of cement or cement and sand generally cause surface scaling.

Power Float: The use of a power float will permit the use of less mixing water and more coarse aggregate, both of which will improve the results.

Curing

The proper curing of LUMNITE cement is essential. All curing must be done within 24 hours. LUMNITE cement surfaces must be cured by sprinkling.

Under average conditions curing water will be required about six hours after mixing. In warm, dry weather it may be required before six hours, and in cold, damp weather as late as ten or twelve hours.

It is better to apply curing water an hour too late rather than a short time too soon. The time for first application of sprinkling can be determined by rubbing the surface with a moistened finger.
IF THE FINGER IS CLEAN AFTER THE RUBBING, SPRINKLING SHOULD START.
IF THE FINGER IS SOILED AFTER THE TEST, SPRINKLING SHOULD BE WITHHELD.

In large areas some portions of the surface will be ready for curing before others. Care should be taken to apply curing water only to those areas that are hard enough to receive curing water. Curing water should be applied sparingly at first. Do not cure by ponding the surface or by covering with wet sawdust, wet burlap or other coverings.

After curing has been started the mortar or concrete should be kept wet by sprinkling until it is 24 hours old. Most users permit the last application of curing water to dry before subjecting the floor to heavy traffic.

MONOLITHIC FLOORS

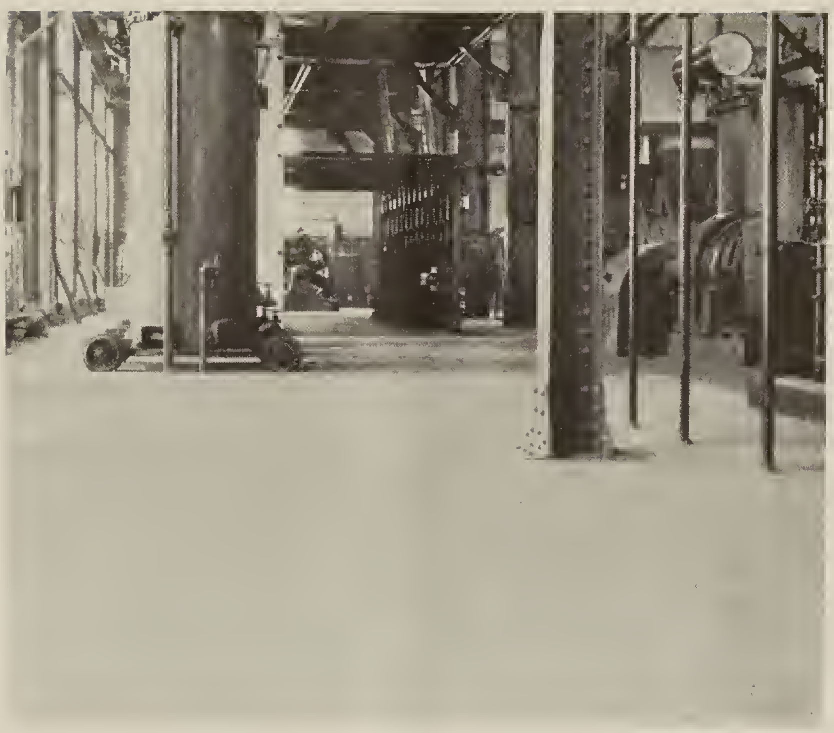
Materials and Proportions

Clean, hard, well-graded fine and coarse aggregates are necessary for successful results.

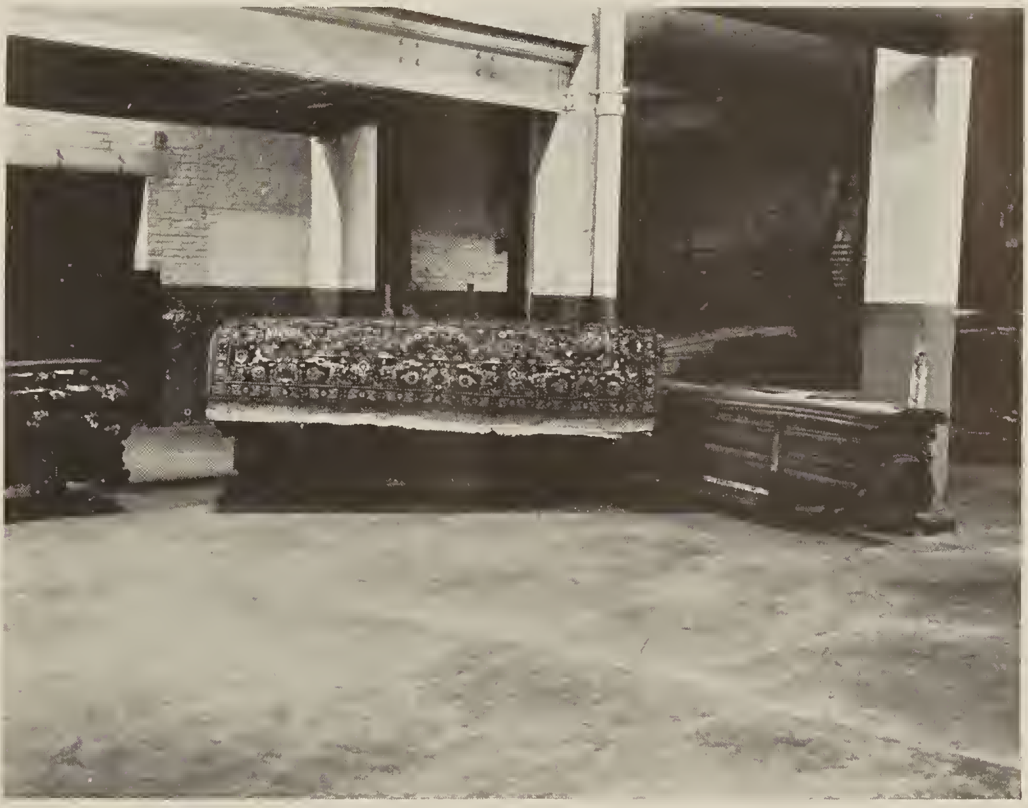
Mixing Water: Excess mixing water is harmful. Do not add more than five gallons of water per sack of cement. Use less whenever possible.

The following proportions are generally used: 1 part cement, 2 parts sand, 3 to 3½ parts coarse aggregate.

For details regarding admixtures, measurement of materials, mixing, finish and curing, see Top Courses for Floors.



Interstate Power Co., Dubuque, Iowa
LUMNITE Floor placed in February, 1926
This picture was made in May 1930



LUMNITE floor placed in several week-ends in 1934. Aisles receiving most severe traffic were placed with very dry mix and finished with power float.
Bigelow Sanford Carpet Co., Amsterdam, N. Y.

A Special Method

Since LUMNITE was first placed on the market we have known that when certain chemical admixtures were added, flash setting would result. We found it necessary to caution against the use of such admixtures for ordinary construction methods. That word of caution is still most important.

However, when placed with a cement gun, in which the water joins the cement at the nozzle, these mixtures are often the means of solving a difficult problem.

We bring this method to your attention only for such special conditions as you may have occasion to meet from time to time. We do not wish to minimize the fact that for ordinary construction methods admixtures should not be used with LUMNITE, due to the fact that such admixtures generally increase the lime content of the cement mixture.

Cement Gun Uses

These quick-setting mixtures used with the cement gun will solve many troublesome problems and will meet many emergencies. They are particularly applicable for shutting off water in general construction work, sealing caissons, stopping seepage from rock seams or for quickly making bulkheads to seal off mine fires. One engineer has pointed out the practicability of making within a few hours a reinforced concrete wall or slab by erecting steel supports, attaching wire mesh and applying these quick-setting mortars with a cement gun.

Tunnel Linings

Railroad tunnel linings in which such quick-setting mixtures have been placed with a cement gun have been in service as long as twelve years. Recent inspection of the 12-year-old linings, as well as of linings placed later, shows that no deterioration has taken place. The LUMNITE-Gunite linings are suggested for the repair of old concrete linings and for new construction. The setting time of the mixtures can be adjusted to suit conditions, so that wet and leaking tunnel walls usually can be sealed without making other provision for the water than the application of the GUNITE coat.

Suggested Mixes

The mixes described on this page have been used with success. They are intended as suggestions which may serve as a guide in starting a job. The actual behavior of a mix must be checked on the job with the materials which are to be used.

LUMNITE and Plaster of Paris

Very small percentages of plaster of Paris, 1% or less by weight of LUMNITE, will quicken the setting time of the LUMNITE without noticeably affecting the strength. Greater percentages, while continuing to quicken the set, will lower the strength.

LUMNITE and Portland Cement

Similar results can be obtained by using equal parts of LUMNITE and portland cement. However, the strength of the LUMNITE-Portland cement mortars will be considerably less at 24 hours than the other mortars, due to the time which must elapse for the portland cement portion to develop its strength.

LUMNITE and Lime

A mixture which will set in less than 30 seconds and produce hard mortar in approximately 30 minutes, can be made by adding 5 pounds of hyrated lime to each bag of LUMNITE used in a 1:2 or 1:3 mortar. We recommend that for each particular condition and requirement the actual time of set be determined with a trial mixture. By varying the amount of lime added to LUMNITE the time of set can be regulated from a matter of a few seconds to as long as an hour or two.

Mixing and Placing

For proper results the portland cement, plaster of Paris, or hydrated lime should be thoroughly mixed dry with the LUMNITE until a uniform color is obtained. The two or three parts of sand should be very dry. Mixing water should have a temperature between 70-100° F. Cooler water will result in slower setting and slower hardening. Water at a temperature of 45-55° F. will produce a set in 15 minutes and extreme hardness in a few hours. The nozzle of the cement should be equipped with a water ring having not less than 16 holes.

GROUTING LEAKS

LUMNITE grout is used for sealing rock seams and fissures or wherever pumped grout is desired. Its quick-hardening properties are highly advantageous in such work around dams, mines and tunnels. The resistance of the grout to the attack of corrosive ground waters is often an important reason for the use of LUMNITE in this manner.

"Suggestions for Using LUMNITE" on the last two pages of this pamphlet contain essential information applying to general concrete and mortar uses. In applying this information to Ready Mixed Concrete the following suggestions are important:

Cleaning

The truck mixers should be thoroughly cleaned to remove all portland cement, and any other foreign material. (Portland Cement mixed with LUMNITE will cause quicker setting - in certain proportions the mixture will be "flash-setting".) Lime and other soluble compounds will also affect the set of LUMNITE. Absolute cleanliness of equipment with which LUMNITE will come in contact is therefore very important.

The flushing water, used to clean out the mixers, should be discarded, and should NOT be used as part of the mixing water for the next batch.

Mixing

Prolonged mixing (more than 1½ minutes) in a concrete mixer may cause the cement to set too fast. It should not be continuously mixed in transit. We suggest the following procedure or its equivalent. First, batch the water into the trucks, follow with the aggregates, then the LUMNITE. Transport to job and begin mixing just prior to dumping the concrete.

LUMNITE concrete has been used very satisfactorily where batches have been mixed at a central mixing plant and the concrete hauled to the job in dump trucks of the lifting body type. In such cases the mixing has been done for 1 minute at the mixing plant and no further mixing occurs in transit.

Weather

During extreme hot weather where the transit mixer drum may become quite warm from exposure to direct sunshine, it is good practice to spray the outside of the drum with cold water to cool it. If aggregates are exposed to the direct sun they may absorb considerable heat. Occasional sprinkling of the piles of aggregate with cold water will assist in reducing the temperature. Bags of LUMNITE should be stored in a shaded place in hot summer weather so as to avoid absorption of solar heat.

In cold weather, where heating of materials is the general practice for portland cement concrete, heat should be applied sparingly to LUMNITE concrete. Better results are obtained with LUMNITE if the concrete leaves the mixer at a temperature of 50°F to 70°F.

Mixing and Placing

LUMNITE concrete can be placed readily in severe winter weather. Few extra precautions are necessary.

Aggregate should be free from frost. Best results are obtained if the concrete is at normal temperature (50° to 70° Fahrenheit) when it leaves the mixer. Concrete should be maintained at or near these temperatures at least until the concrete has set and begun to harden.

Use heat only to avoid freezing temperatures in the concrete.

Do not use heat to hurry the hardening at any time.

The concrete should not be heated above 70° F.

Use the least amount of water possible.

Do not use "anti-freeze" admixtures or accelerators.

Curing

Curing water is necessary in cold weather only if the concrete surfaces appear to dry out during the first 24 hours.

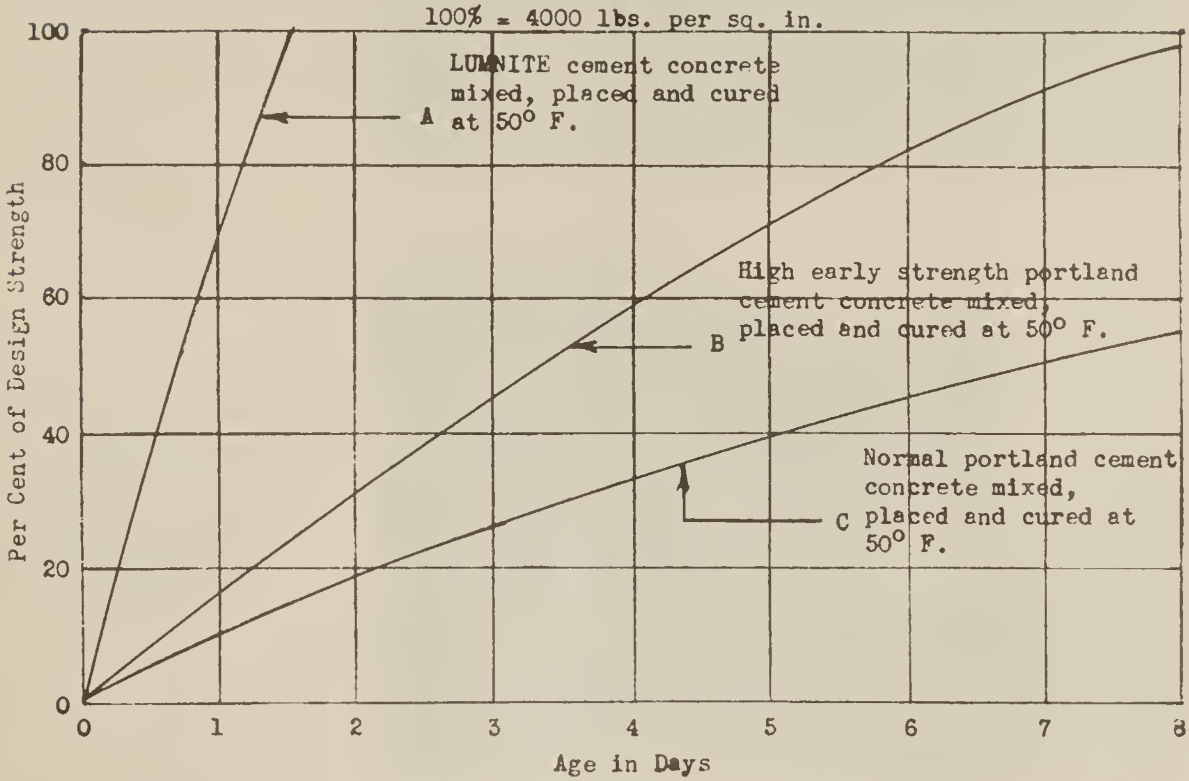
Aggregates

Aggregates, proportions and other general provisions for winter concrete are the same as discussed under the heading "Structural Concrete".

Comparative Tests

The graph and data on page 15 are of interest in comparing the three types of structural cements which are in general use for winter construction.

Comparison of (A) LUMNITE, (B) high early strength portland and (C) normal portland cement concrete when mixed, placed and cured at 50° F. In each case all materials were brought to 50° F. before cylinders were made.



Below is the designed strength had the concrete in the above tests been mixed, placed and cured at 70° F. instead of 50° F.

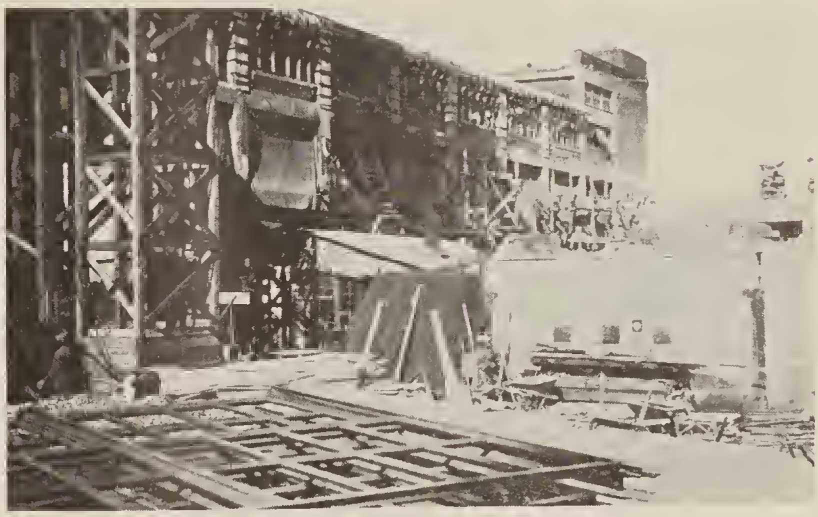
A - LUMNITE cement in 1-2-4 mix by volume, using 6½ gal. of water per bag of cement. 6" x 12" cylinders. When mixed and cured at 70° F. this mix developed 3457 lbs. per sq. in. at 24 hrs. Tests made by Columbia University.

B - High early strength portland cement in mix designed for 4000 lbs. per sq. in. at 3 days, when mixed and cured at 70° F. 3" x 6" cylinders. Data from article in Engineering News-Record, Sept. 6, 1934, by A. G. Timms, Asst. Mgr. Research Laboratory, Portland Cement Association.

C - Normal portland cement in mix designed for 4000 lbs. per sq. in. at 7 days when mixed and cured at 70° F. Cylinders 3" x 6". Data from article in Engineering News-Record, Sept. 6, 1934, by A.G. Timms, Asst.Mgr. Research Laboratory, Portland Cement Association.

COLD WEATHER CONCRETE

Industrial Conveyor Footings
Placed in Zero Weather
with LUMNITE.



LUMNITE Concrete Beams,
Columns, Floors.

A Rush Winter Job
by Wm. Steele & Sons Co.
for Freihofer Bakery
Philadelphia, Pa.

Foundations Placed at 17° F.
Without Artificial Heat or
Expensive Protective
Measures

B. S. Moss Co. Theatre
Brooklyn, N. Y.

SUGGESTIONS
FOR USING
LUMNITE

Proportions

Mortars made of 1 part LUMNITE and 2½ parts sand meet most ordinary construction requirements. Richer mortar mixes should not be used except in very thin sections.

Concrete made of 1 part LUMNITE with approximately 2 parts sand and 4 parts stone (or gravel) is satisfactory for most purposes. Leaner concrete mixes frequently require too much mixing water and should be avoided. Richer concrete mixes are usually unnecessary and uneconomical. They should only be used for concrete of small dimensions.

MIXING WATER
Use Least Amount Possible

Concrete made with 5 gallons of mixing water per bag of LUMNITE cement will be more than twice as strong and more durable than concrete made with 10 gallons

For mortars, do not use more than 5 gallons and for concretes no more than 7 gallons per sack of cement, including the moisture in the aggregates.

Proper Curing Important

Curing water should be applied by sprinkling or spraying, especially the first few applications. Flooding the surface with excessive amounts of curing water, especially at the start of curing, should be avoided. Do not cure by wet coverings, such as burlap, sawdust, or sand as this reduces surface strength and causes dusting.

In mass concrete, forms should be removed as soon as concrete will support its own weight to increase the surface area to be cured. Surfaces should be kept wet until concrete is 24 hours old.

Under average conditions curing water will be required about 6 hours after mixing. In warm, dry weather it may be required before 6 hours and in cold damp weather as late as 10 or 12 hours. Curing water applied too soon will lower the surface strength of concrete. The time for first application of curing water may be determined by rubbing the surface with a moistened finger. **If the finger is clean after the rubbing, sprinkling should start. If the finger is soiled by the test, sprinkling should be withheld.**

In applying curing water to large areas, care must be taken at the start of curing to cure only those sections that are sufficiently hard to resist the washing effect of water. Where an entire area must be cured at the same time, it is much better to allow the first sections to remain uncured for an hour or two longer than to apply curing water on the last sections too soon.

The application of curing water is very important when LUMNITE is used in warm weather, in rich mixes, in large masses, and on large exposed surfaces where maximum surface strength is desired, such as floors, sidewalks, pavements, etc.

Steam curing or heating to hasten the hardening of LUMNITE should not be used.

AVERY
CLASSICS